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IS 11240 (1985): Method for falling weight test on metallic materials [MTD 3: Mechanical Testing of Metals]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

METHOD FOR FALLING
WEIGHT TEST ON METALLIC MATERIALS

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

METHOD FOR FALLING WEIGHT TEST ON METALLIC MATERIALS

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Indian Standard

METHOD FOR FALLING WEIGHT TEST ON METALLIC MATERIALS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 February 1985, after the draft finalized by the Methods of physical Tests Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Falling weight test on metallic materials is generally used to evaluate the ductility of the material when subjected to shock loading. This test is also referred to as drop test or tup test. This test is most commonly used as one of the acceptance tests for railway rolling stock components like rails, axels, solid wheels and tyres. This standard has been prepared with the object of rationalising the test procedure for general guidance. The requirements to be specified in a material standard for conducting the test for any material are given in Appendix A. Appropriate reference to this standard should be made in the material standard wherever the falling weight test is specified.

0.3 In reporting the result of a test made in accordance with this standard if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS:2-1960*.

1. SCOPE

1.1 This standard prescribes the method for conducting the falling weight test on metallic materials. The test shall be carried out on the finished product in the condition to be delivered to the purchaser unless otherwise agreed between the manufacturer and the purchaser.

2. PRINCIPAL OF TEST

2.1 The test consists in subjecting the test piece to a known impact force to evaluate the ductility and internal soundness of the material when subjected to shock loading.

*Rules for rounding off numerical values (*revised*).

3. TEST PIECE

3.1 The material tested shall be finished product of proper identity.

3.2 A representative sample shall be selected for the lot offered for testing.

4. TESTING MACHINE

4.1 The anvil block shall be strong and rigid enough not to cause any vibration or deflection during testing.

4.2 Support for Test piece — The test piece shall be suitably supported. The supports shall be rigid and heavy and shall not deflect or vibrate under the impact of the falling weight.

4.3 Concrete Foundation — The metal anvil shall be supported directly on concrete block of sufficient strength.

4.4 Guide for Falling Weight — Vertical guides with proper clearance shall be provided for free fall of the weight.

4.5 Falling Weight — The falling weight shall be of appropriate mass and shape consistent with the component to be tested.

4.6 Height Gauge — The height of drop shall be clearly marked on the vertical guide and be readable from the floor level.

4.6.1 The zero reference point shall nominally be 100 mm above the support.

5. TEST PROCEDURE

5.1 The test piece shall be kept in vertical, horizontal or any other position in accordance with the requirement of material specification.

5.2 In case of circular test piece like railway wheel in horizontal position, the same shall be supported at least at three equi-distant places unless otherwise stated.

5.3 In case of straight test piece the distance of support shall be as specified in the material specification.

5.4 The test piece shall be supported in such manner that the weight shall strike the centre of test piece.

5.5 The falling weight shall be raised to a height as indicated in the material specification and shall be allowed to fall freely to strike the test piece. The number of drops and the position of the test component between the successive drops shall be as specified in the material specification.

5.6 If required, the deflection or depression of the test piece at the centre from its original position shall be measured after each blow.

5.7 The test shall be continued till the required deflection or the number of blows as specified in the material specification is reached.

6. TEST REQUIREMENTS

6.1 The interpretation of deflection and or the fracture shall be made in accordance with the material specification as given in Appendix A.

A P P E N D I X A

(Clauses 0.2 and 6.1)

REQUIREMENTS TO BE SPECIFIED IN MATERIAL SPECIFICATION

A-1. The material specification shall specify the following for carrying out the falling weight test in accordance with the requirements of this specification:

- a) The position of test piece during test, that is, vertical, horizontal or upside down;
- b) Length of test piece or any other description;
- c) Height of fall of the weight and number of blows;
- d) Distance between supports;
- e) Shape and mass of the falling weight;
- f) Deflection of test piece;
- g) In case of repeatative drop test, successive height of fall and the minimum height of fall without fracture; and
- h) Interpretation of fractured test piece for significance.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	1 N = 1 kg. m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²